

CALIFORNIA MICROLEPIDOPTERA III

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GELECHIIDÆ

Recurvaria ceanothiella Braun

This species, which was described from the yellow pine forest region of the Sierra Nevada mountains as feeding on *Ceanothus divaricatus* Nutt., is here recorded from Marin County, California, as occurring at Mill Valley, Phoenix Lake, and Lagunitas. In Marin County *Ceanothus thyrsiflorus* Esch. and *C. soledadensis* H. and A. are the species infested. *Ceanothus thyrsiflorus* and *soledadensis* are very similar and occur in the coastal humid region. *C. divaricatus* is evidently much the same as it occurs in a region which has many of the same or closely related plants to those of the coast. It may be mentioned here that some species of the genus *Ceanothus* are entirely unsuited in structure to the needs of this moth.

The larva of *ceanothiella* is a leaf miner as described by Miss Braun. The mine is narrow and linear at first, with side branches. The main part of the mine is typically "horseshoe" shaped, extending apically along one side of the midrib, curving over below the apex, and back on the other side. The larva with head inward may be found at one end of the main gallery in the entrance hole, which opens from the underside of the leaf and over which is spun a silken covering. The frass is voided, none being found in the mine. On nearing maturity the larva mines out the leaf in all directions, forming more of a blotch mine and scattering the frass throughout. These mines were noted from March 5 to April 16, 1927. Pupation is as described by Miss Braun.

The body of a young larva is creamy white, but on nearing pupation is as follows: Body generally cream-white, heavily overlaid pink; head flattened, ochreous or light brown, sides blackish; prothoracic shield body-color or slightly ochreous; last abdominal segment and anal plate lighter than abdomen; tubercles very weak, uncolored; hairs short, colorless; crochets unevenly biordinal, circle complete, 18 to 22; length 6 mm.

Pupa: Anterior end rather blunt, body widest at metathorax, tapering to rather acute caudal end; ventral line from middle of body to caudal end more convex than corresponding dorsal line; brownish or brownish-ochreous; surface glabrous except for usual hairs which

are short and inconspicuous. Maxillæ rather wide at base, short, ending at convergence of midlegs; forelegs ending along sides of maxillæ; midlegs ending at convergence of antennæ; antennæ diverging just before tips exposing ends of hind legs, which end even with antennæ and wing cases on, or a little past, anterior margin of the seventh abdominal segment. Abdomen quite short, extreme tip blunt, no free segments, no cremaster but a number of hooked hairs on caudal end. Length, $3\frac{1}{2}$ to 4 mm.

The male genitalia of this species are small, entirely lacking harpes. The uncus and œdeagus are the only conspicuous parts, supported by a heavy tegumen.

Adults emerged in the laboratory from April 20 to June 10, 1927.

Recurvaria francisca Keifer, new species

This grayish species is very similar to the preceding in adult appearance, but the ground color is not as definitely ochreous-tinged if at all, and the dark coloring is noticeably not as black. There are greater differences than the adult appearance which will be subsequently noted. This is, however, an obscurely marked species, and the following description attempts to take in the variations:

Palpi rather slender; basal two-thirds of second joint black, white above inwardly, apical third white mottled blackish or with an incomplete black annulus; terminal joint inclined to be rough apically, white, black at extreme base, black annulus just below middle, wide black annulus just below tip, extreme tip white. Antennæ with basal joint whitish below in front, blackish fuscous above; stalk usually with alternately lighter and darker annulæ, the lighter widest. Head above white, each scale tipped dark fuscous; face white slightly ochreous, shining, faintly mottled fuscous at sides. Thorax white generally obscured by dark fuscous; two opposite black dots touching posterior margin just before tip; tegulæ as head. Forewings whitish, each scale tipped with dark fuscous, with a number of black dots on wings and three dorsal scale tufts; a blackish shade from costal base, running obliquely outward and ending just across fold in black tuft which is outwardly white, opposite which well within costa is a black spot more or less completely edged white; just beyond these at costal third a conspicuous black spot more or less surrounded by white, opposite which is a black dorsal tuft touching the fold and between these a black spot, sometimes edged outwardly by a white spot which is often followed by another black dot; the third black tuft well within tornus, and almost opposite this from costa, a more or less distinct narrow whitish fascia runs directly in for a short distance, turns abruptly outward and curves down to outer margin not halfway to apex from tornal tuft; a blackish apical

spot at base of cilia preceded on bases of costal and outer marginal cilia by two or three more or less distinct black spots; sometimes a blackish area well within apex; tornal cilia light fuscous. Hind wings light fuscous, cilia same, slightly ochreous-tinged. Abdomen whitish suffused fuscous, darker dorsally. Fore and midlegs white, heavily overlaid except at apices of joints with blackish fuscous; hind legs ochreous white, a broad fuscous stripe along outer side of tibiae, broken by a white spot at inner spurs, tarsi mottled fuscous at bases outwardly. Expanse, 8 to 12 mm.

Holotype, male, No. 2539, and *allotype*, female, No. 2540, Mus. Calif. Acad. Sci., reared from *Ceanothus thyrsiflorus* Esch. in San Francisco, California, by the author, April 27 and 25, 1927, respectively. Fifty-three *paratypes*, males and females, reared from *Ceanothus thyrsiflorus*, collected in San Francisco, and in Mill Valley, Marin County. Eight paratypes from *Ceanothus soledadensis* H. and A., the larva collected at Phoenix Lake, Marin County. These paratypes emerged from February 13 to August 19, 1927. The specimens from Marin County are generally less maculated than those from San Francisco, but agree in general appearance, larval habit and genitalia. Four paratypes are in the collection of Miss A. F. Braun, four in the collection of Dr. Barnes, and four in the United States National Museum.

The genitalia of *francisca* are small but with all the usual organs present. The harpes are rather short, slender and symmetrical, with large basal lobes. Thus *francisca* differs from *ceanothiella* in possessing harpes.

The mine of the new species is a rusty-colored blotch, typically beginning at or near the apex of the leaf. The entire substance between the two epidermal layers of from one-half to the whole leaf is eaten in the course of the larval life. The epidermis is preserved as nearly intact as possible and the frass is not voided but spun back in the older parts of the mine on each side of the larval retreat. On maturing, the larva cuts its way out of the newer portion of the mine, leaving the frass scattered, and probably pupates in trash below the bush in a cocoon spun between two or more objects. Mature larvæ were found from late January to June, 1927.

The young larva has a black head and shield with a sordid white or grayish body. Later the body becomes whiter and then slightly bluish. *Mature larva*: Head flattened, deep brownish black with brown mouthparts; thoracic shield variously shaded with brownish black,

usually almost body-color anteriorly, grading into deep brownish black on posterior half or two-thirds, median line narrow. Body usually bluish white more or less overlaid pink especially on abdomen; anal plate yellowish to fuscous; gonads dark fuscous; ganglia visible ventrally; thoracic legs black on chitinized parts; prolegs often with a fuscous annulus, crochets in a complete circle, unevenly biordinal, 22 to 28; tubercles very weak, uncolored, hairs fine, uncolored; length, 6 to 7 mm.

The pupa is essentially the same as that described for *ceanothiella* but differing in that the maxillæ are slightly shorter, the maxillary palpi smaller and the hind legs more nearly approaching the posterior margin of the seventh abdominal segment.

The most striking external differences between *francisca* and *ceanothiella* are in the larval appearance and habit, which may be summarized as follows: *francisca*—head and shield of larva blackish, body sordid white or bluish white, mine a blotch, frass not voided; *ceanothiella*—head of larva ochreous, shield and body creamy white, mine typically linear and branching, frass voided through a hole at one end of the mine.

In placing the new species in the genus *Recurvaria* the venational characters were relied upon to the exclusion of the genitalic and larval characters. The only point of difference which either of these species shows from the genus *Tosca* is in the venation, which is as in the genus *Recurvaria*; all other characters mentioned in the definition of *Tosca* are present. A comparison of the pupæ of these species with that of *Recurvaria bacchariella* Keifer (a true *Recurvaria*) shows several marked differences: *francisca* and *ceanothiella*—pupa with maxillæ ending at the convergence of the midlegs, abdomen with no movable sutures and much shortened; *bacchariella*—maxillæ of pupa ending at convergence of antennæ, abdomen not shortened and with three flexible sutures. It does not appear advisable to disregard the venation at present, but it is felt that this combination of characters should be mentioned .

ORTHOPTERA WANTED

I am revising the species of the genera *Ceuthophilus* and *Pristoceuthophilus* (Orthoptera, Tettigoniidæ, Raphidophorinæ), and will be glad to determine material of these genera from any part of the country. I desire especially to see western material.—T. H. Hubbell, Museum of Zoology, University of Michigan, Ann Arbor, Michigan.